An Overview of Capabilities at the NIST Center for Neutron Research

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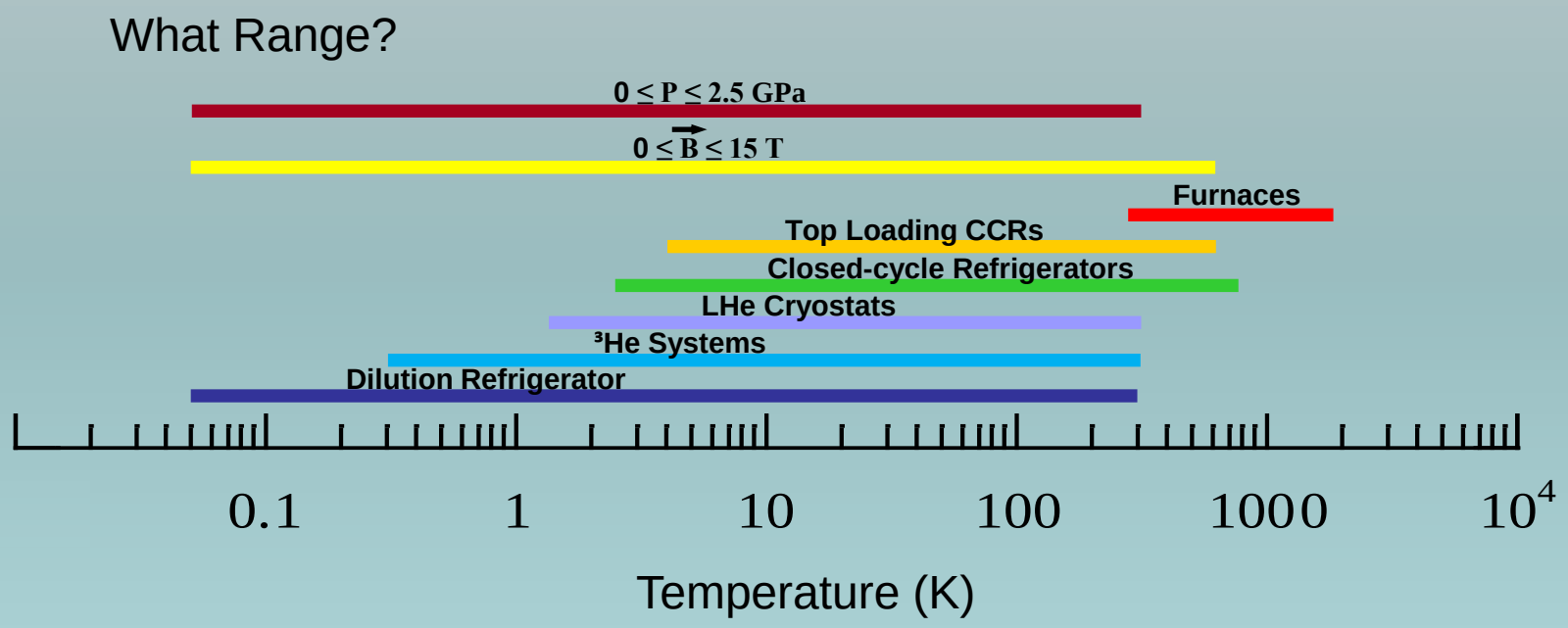
7th International Workshop on
Sample Environment at Neutron Facilities
Sydney, Australia

- The Tool Belt
- The Right Tool for the Right Job
- News
- Planning
- Safety vs. Results
- R&D

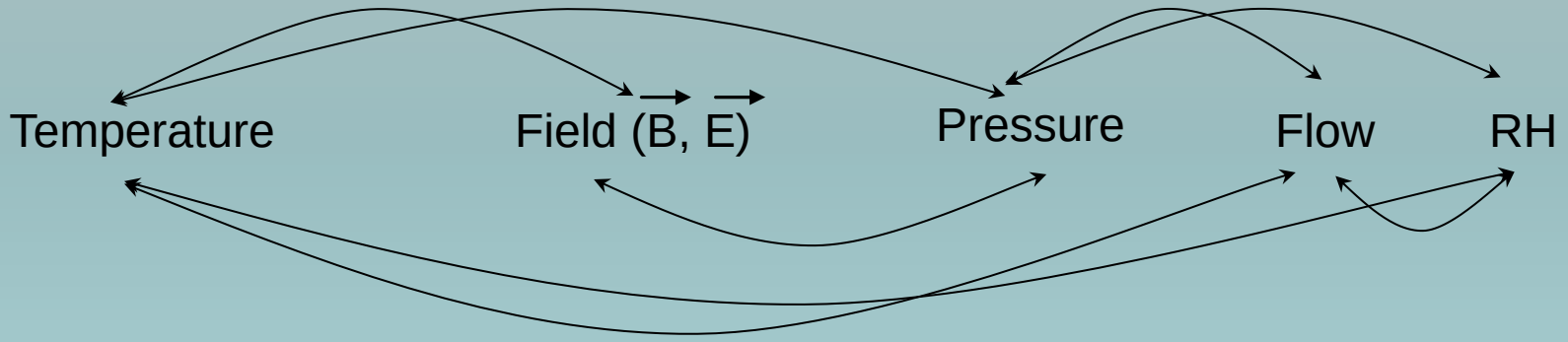
The Tool Belt



http://www.ncnr.nist.gov/equipment/ancequip.html

The Right Tool for the Right Job

What is important? At what instrument?

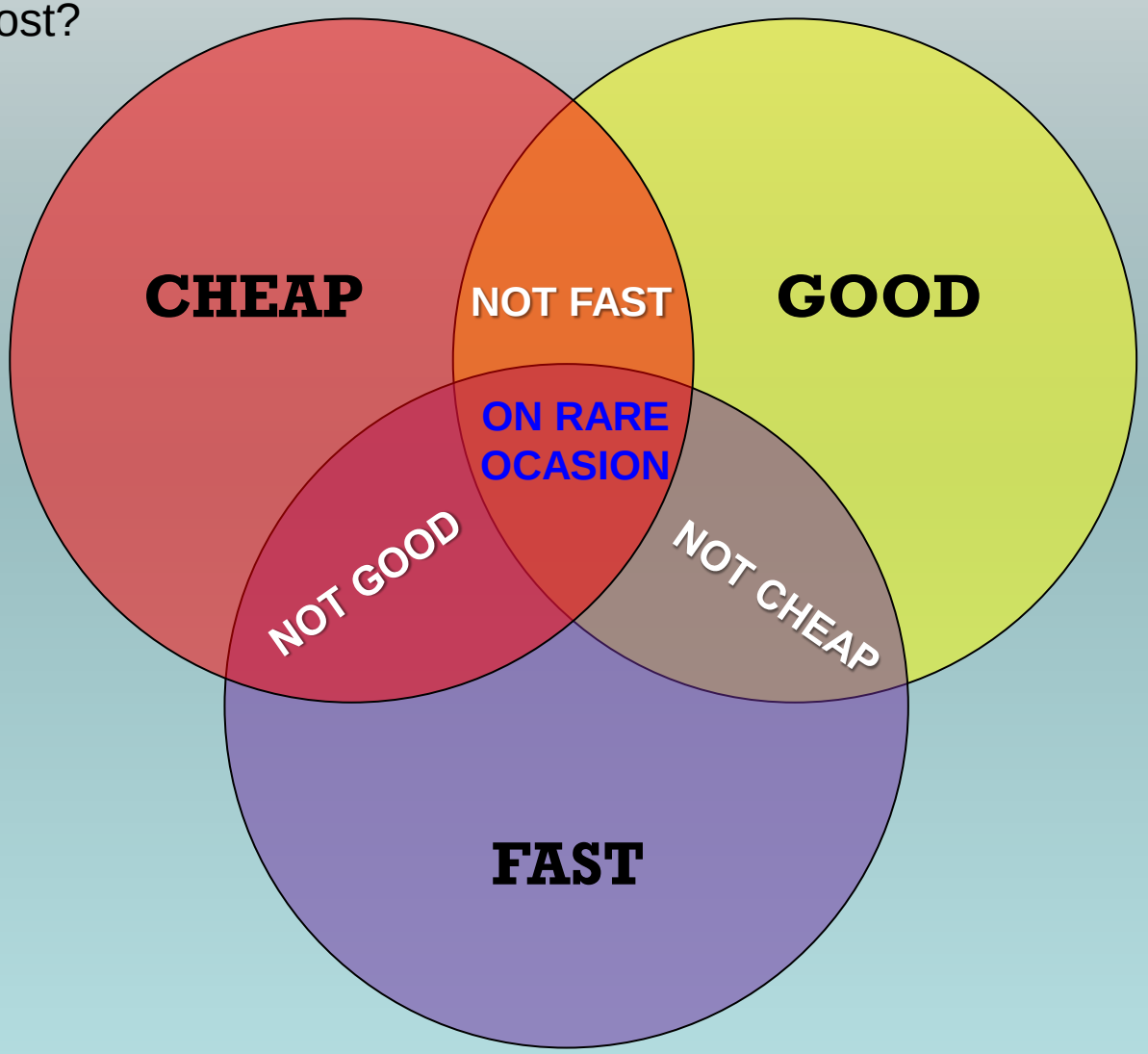


Data Acquisition Time Accuracy and Precision

Simultaneous Multi-Techniques

http://www.ncnr.nist.gov/equipment/ancequip.html

At what cost?



News

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Newly commissioned SAN

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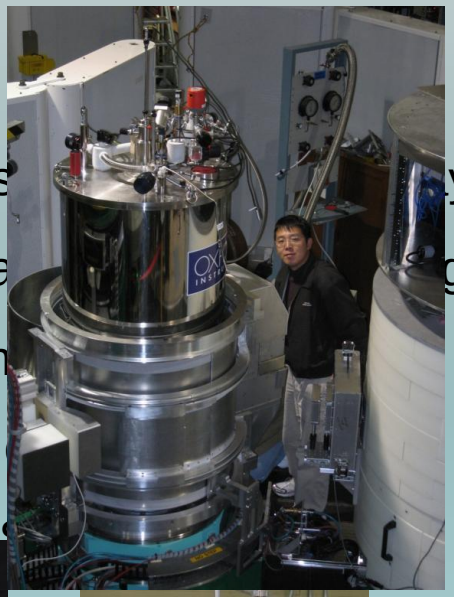


Planning

Prior
Preparation
Prevents
Poor
Performance

- Preparation **(S.E. consultation)**
- Submission
- Review
  - ✓ Scientific – national & international experts
  - ✓ Technical & Safety Review **(S.E.)**
  - ✓ Proposal Assessment Committee (PAC)
- Scheduling
  - ✓ User Office
  - ✓ Instrument Scientists **(S.E. consultation)**
- Arrival **(24 Hrs. prior)**
- Completion
- Customer feedback

http://www.ncnr.nist.gov/

Reality

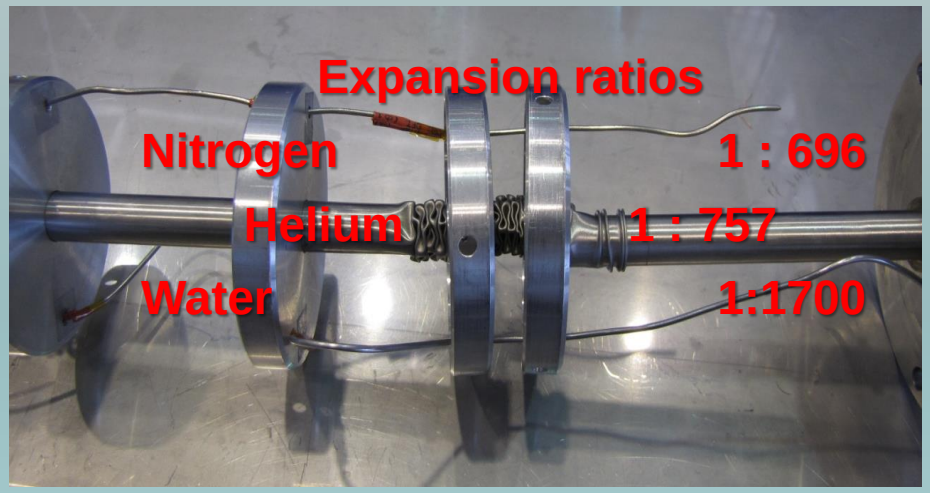
- Preparation ~~(S.E. consultation)~~
- Submission
- Review
  - ✓ Scientific – national & international experts
  - ✓ Technical & Safety Review **(BYO S.E or n/a)**
  - ✓ PAC **(Proposal Calls for Ambient Conditions)**
- Scheduling **SE GROUP IS RELIEVED**
  - ✓ User Office
  - ✓ Instrument Scientists ~~(S.E. consultation)~~
- Arrival **(Day of experiment)**
  (Parameters changed)
  SE scrambles to meet demand
- Completion
- Customer feedback **@!%!**#~@#!! SE Group**

http://www.ncnr.nist.gov/

Safety vs. Results

Stick to the plan

Slow down and be vigilant



In doubt ask

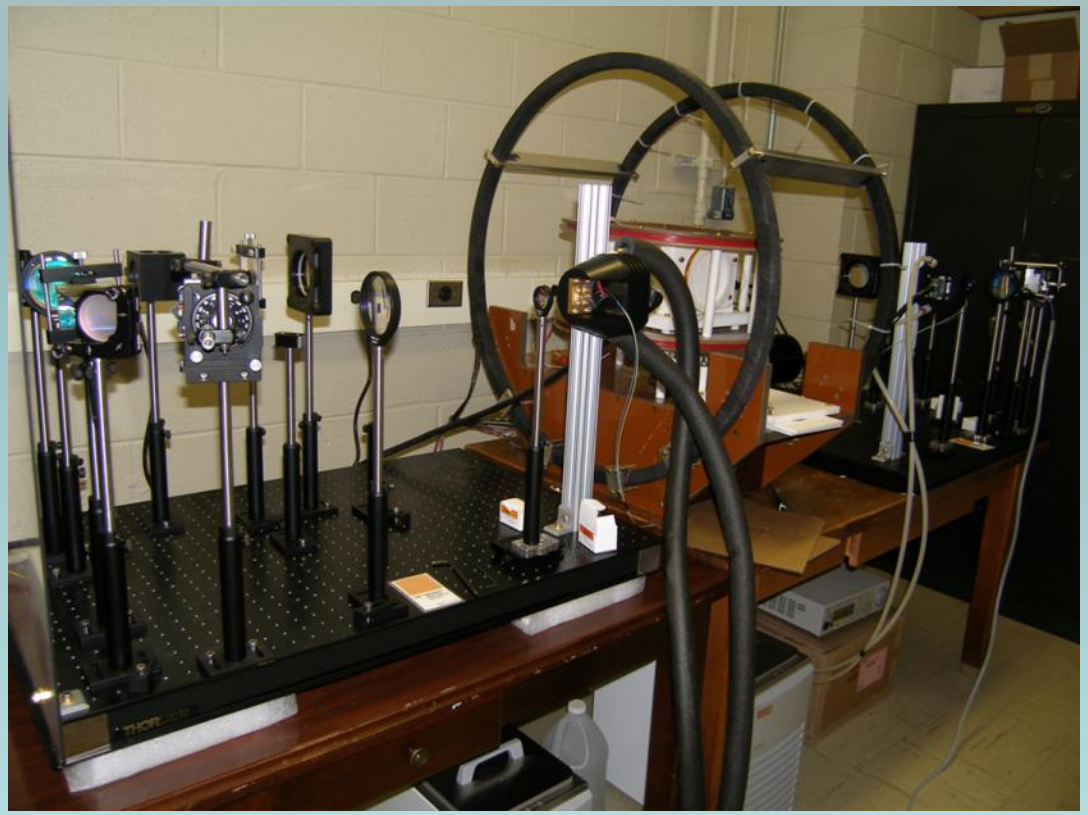
Know your sample

Yes! My sample IS dry!

^{3}He Polarization

^{3}He program for scattering applications

SEOP lab



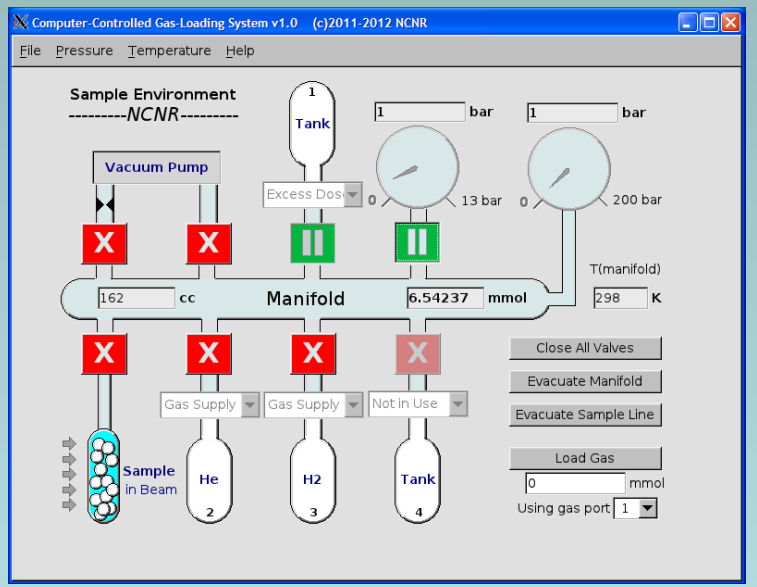
Currently available for 3-axis, reflectometry, and SANS

≈ 20 experiments/year

Computer Controlled Gas Handling Manifold

Pressures up to 200 bar
Resolution: 0.01% of F.S.
Accuracy: ±1% Reading
Flow restrictors to prevent gauge saturation, vacuum pump
Intrinsically safe wiring
Explosion proof enclosure, gauges and valves
Sample volume protected via expansion volume

Easy pull-down menus
Supports scripting for remote beam line experiments
Works either as a stand-alone program or in the background controlled by ICP
Expandable



Software Screen Shot

Multi-stage SAmple Changer

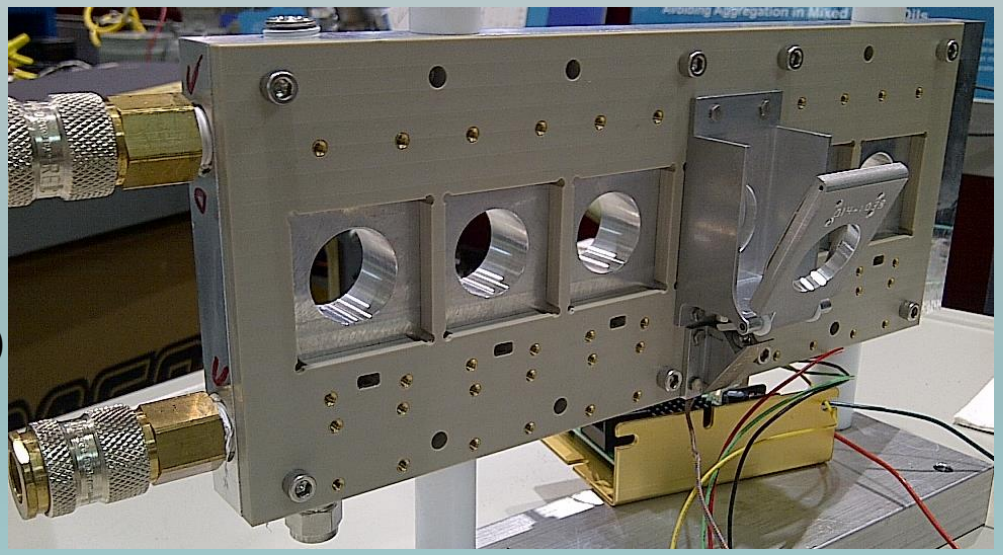
Prototype:

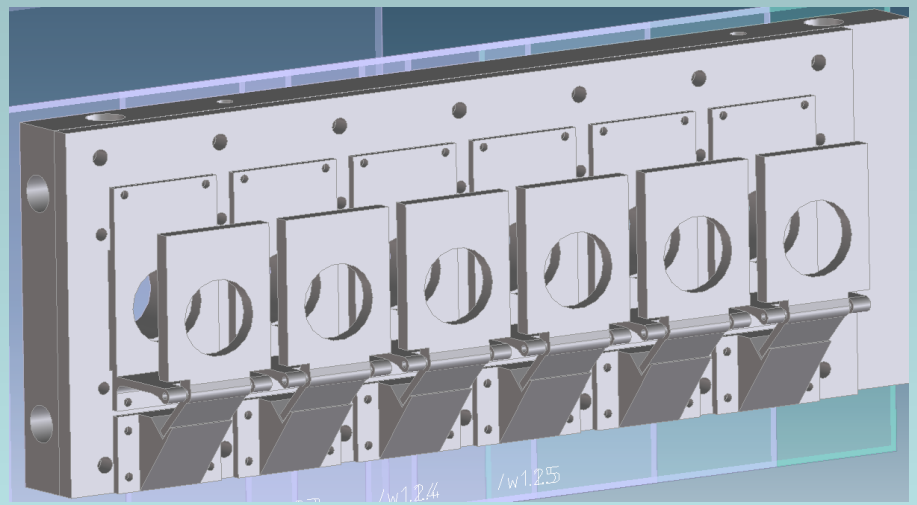
6 Samples

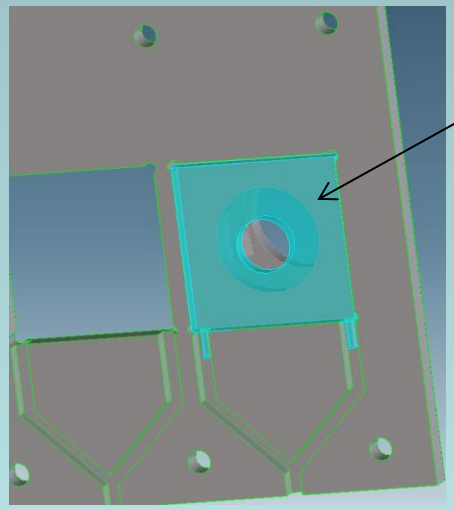
$253\ \mathrm{K} \leq \mathrm{T} \leq 393\ \mathrm{K}$

$t_{\Delta \mathrm{T}=100\mathrm{K}}$: $1\ min.\ (0.25\ K\ acc.)$

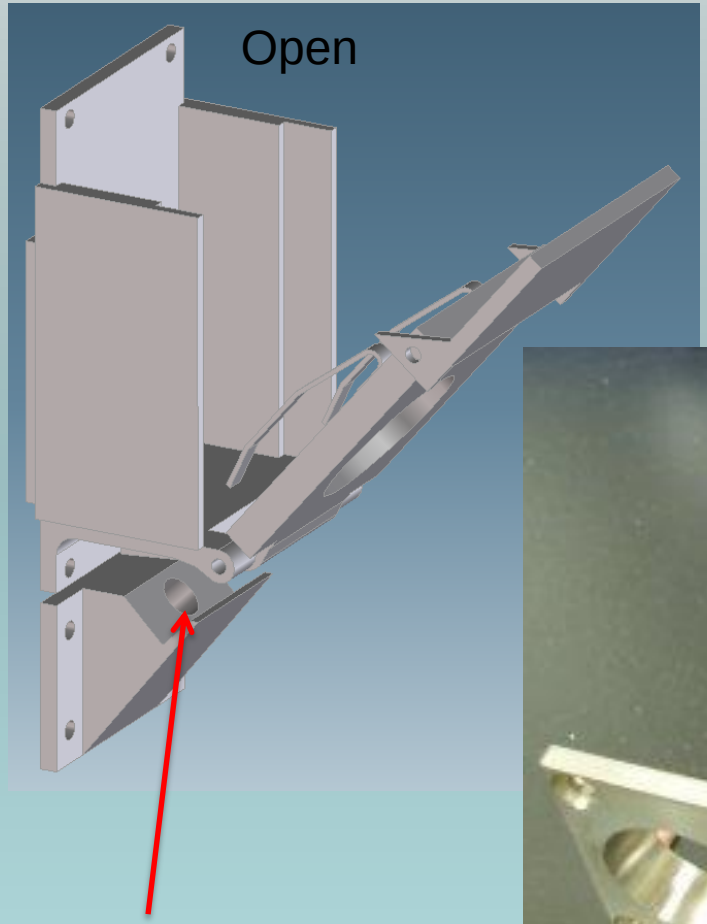
: $5\ min.\ (0.1\ K\ acc.)$



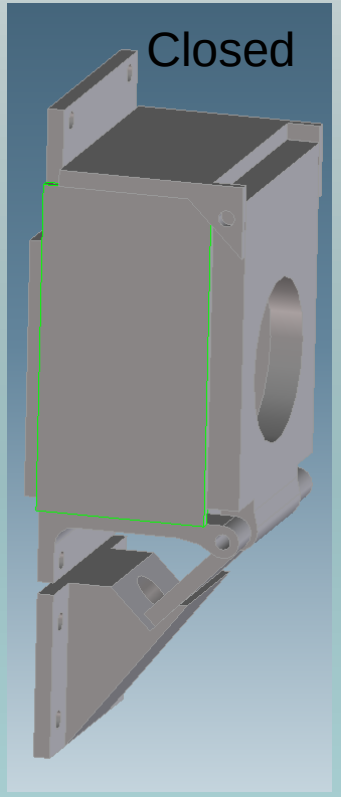


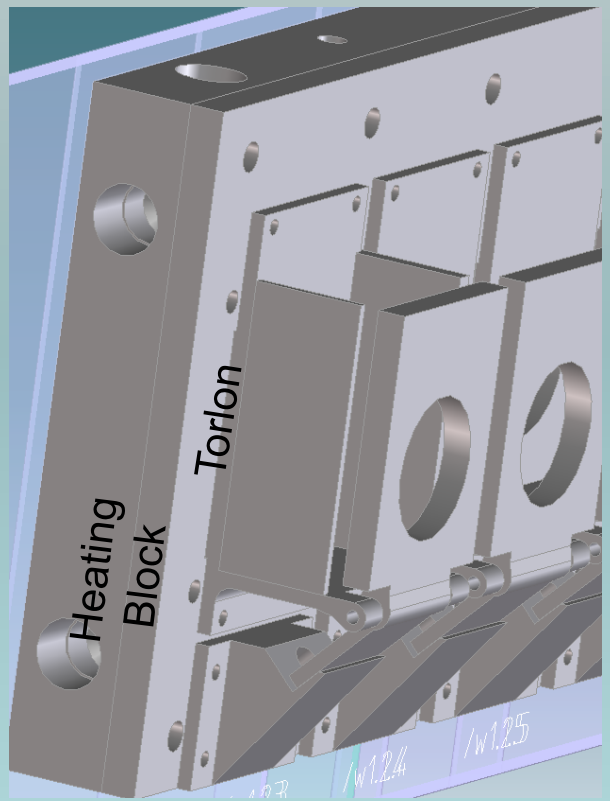


Thermoelectric module



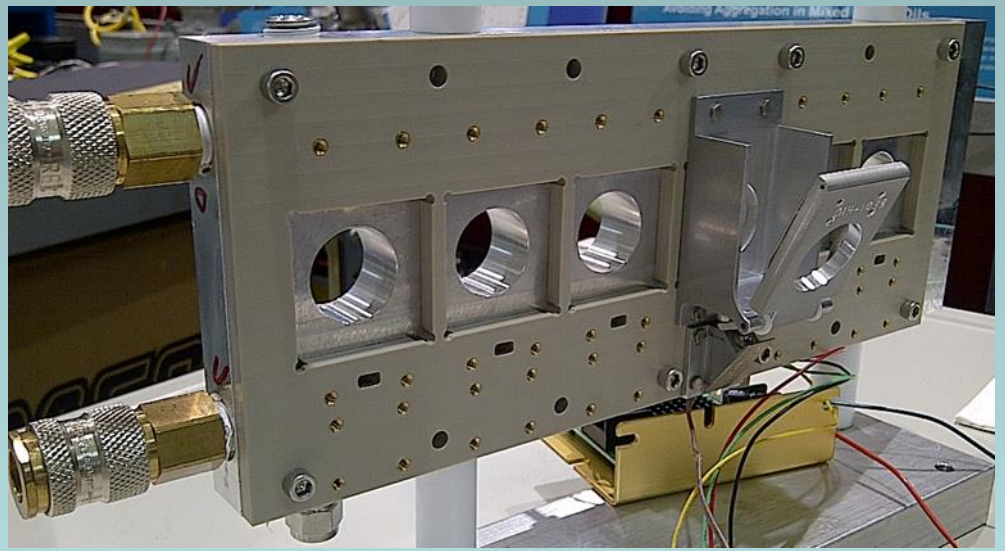
Receives pre-existing SANS demountable cells
Ease of sample change





Torlon vrs PTFE:

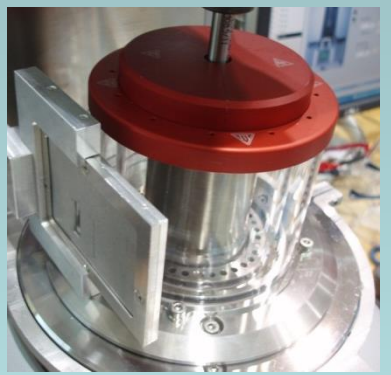
Thermal Conductivity 0.250 W/m-K
Deflection Temperature at 1.8 Mpa
PTFE: 93.3 °C
Torlon: 278 °C



SANS Rheometers

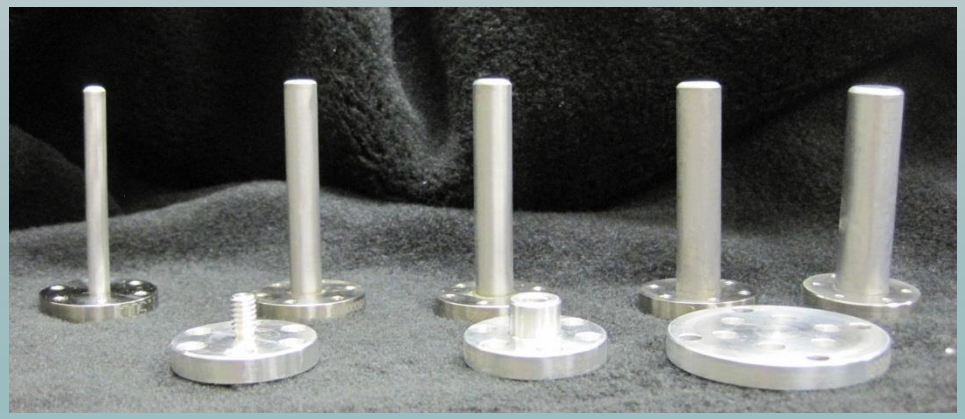
MCR 501

- Rheology
  - Couette Geometry
  - Cone-Plate/Plate-Plate
  - Torque Ranges
    - MCR501: 0.1 μNm – 230 mNm
    - MCR301: 0.1 μNm – 200 mNm
    - Shear Stress: 0.5 mPa – 5.5 MPa
- RheoSANS
  - Couette Geometry
    - 1,3 and 2,3 planes
    - Cups and Bobs from Titanium and Quartz
  - Static SANS Cell
  - Time Resolved Measurements



Contact Jeff Krzywon at jeff.krzywon.nist.gov

Sample Cans



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Air sensitive/gas loading
$P_{max} =$ 5 bar (V)
$4\ K \leq T \leq 800\ K$
Heated gas line available for methane and CO_2

SANS Gas Adsorption
$P_{max} = 1{,}000$ bar
$LN_2 < T < 350K$
Beam divergence angle $\theta \approx 20º$